

CLAIMS

What is claimed is:

1 A chuck for a plasma processor, said chuck comprising:

a temperature controlled base;

a thermal insulator disposed on top of said base, said thermal insulator having a thermal conductivity of less than about 1W/mK;

a flat support for holding a workpiece, said flat support disposed on top of said thermal insulator; and

a heater embedded within said flat support.

- 2. The chuck according to claim 1, further comprising a thermal conductor disposed between said flat support and said workpiece.
- 15 3. The chuck according to claim 1, wherein said thermal conductor further comprises a helium gas.

The chuck according to claim 1 wherein said thermal insulator further comprises a polymer.

The chuck according to claim 1 wherein said heater further comprises a plurality of planar heating elements.

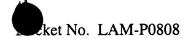
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- 6. The chuck according to claim 5 wherein said plurality of planar heating elements forms a plurality of heating zones.
- 7. The chuck according to claim 5 wherein the power of each of said planar heating elements is controlled independently.
 - 8. The chuck according to claim 7 further comprising a sensor for each of said heating zones, said sensor measuring and sending a signal representative of the temperature for each of said heating zones.
 - 9. The chuck according to claim 8 further comprising a controller for receiving said signal from said sensor and for adjusting the power of each of said planar heating elements based on a set point for each of said heating zones.
- 15 10. The chuck according to claim 1 wherein said heater is formed with etched foil technology.
 - 11. The chuck according to claim 1 wherein said flat support further comprises a high temperature non-electrically conductive material.
 - 12. A chuck for a plasma processor, said chuck comprising:

a temperature controlled base;





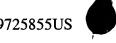
a thermal insulator disposed on top of said base, said thermal insulator having a low thermal conductivity of less than about 1W/mK;

a flat support for holding a workpiece, said flat support disposed on top of said thermal insulator, and

- 5 a heater disposed between said thermal insulator and said flat support.
 - 13. The chuck according to claim 12, further comprising a thermal conductor disposed between said flat support and said workpiece.
- 10 14. The chuck according to claim 13 wherein said thermal conductor further comprises a helium gas.
 - 15. The chuck according to claim 12 wherein said thermal insulator further comprises a polymer.
 - 16. The chuck according to claim 12 wherein said heater further comprises a plurality of planar heating elements forming a plurality of heating zones.
- 17. The chuck according to claim 16 wherein the power of each of said planar heating elements is controlled independently;



- 18. The chuck according to claim 17 further comprising a sensor for each of said heating zone, said sensor measuring and sending a signal representative of the temperature for each of said heating zone.
- The chuck according to claim 18 further comprising a controller for receiving said signal from said sensor and adjusting the power of each of said planar heating elements based on a set point for each of said heating zone.
- 20. The chuck according to claim 12 wherein said heater is formed with etched foil technology.
 - 21. The chuck according to claim 12 wherein said flat support further comprises a high temperature non-electrically conductive material.
- 15 22. An apparatus for controlling the temperature distribution across a workpiece, said apparatus comprising.
 - a temperature controlled base;
 - a first interface disposed on top of said base;
 - a thermal insulator disposed on top of said first interface, said thermal insulator
- 20 having a thermal conductivity of less than 1W/mK;
 - a heater embedded within said thermal insulator;
 - a second interface disposed on top of said thermal insulator; and
 - a flat support for holding the workpiece disposed on top of said second interface.



- The apparatus according to claim 22 further comprising a thermal conductor 23. disposed between said flat support and the workpiece.
- 5 24. The apparatus according to claim 23 wherein said thermal conductor further comprises a helium gas.
 - The apparatus according to claim 22 wherein said first interface and said second 25. interface further comprise a polymer.
 - The apparatus according to claim 38 wherein said thermal insulator further 26. comprises a high temperature non-electrically conductive material.
- The apparatus according to claim 22 wherein said heater further comprises a 27. plurality of planar heating elements defining a plurality of heating zones. 15
 - The apparatus according to claim 27 wherein the power of each of said planar 28. heating elements is controlled independently.
- The apparatus according to claim 28, further comprising a sensor for each of said 20 29. heating zones, said sensor measuring and sending a signal representative of the temperature for each of said heating zones.

- 30. The apparatus according to claim 29, further comprising a controller for receiving said signal from said sensor and adjusting the power of each of said planar heating elements based on a set point for each of said heating zones.
- 5 31. The apparatus according to claim 22 wherein said heater is formed with etched foil technology.
 - 32. The apparatus according to claim 22 wherein said flat support further comprises a high temperature non-electrically conductive material.

33. A method for controlling the temperature across a workpiece profile having multiple zones, said method comprising:

providing a base maintained at a constant temperature, said constant temperature being below the temperature of the workpiece, said base having a thermal insulator mounted on top of said base;

holding the workpiece against a top face of a workpiece holder, said workpiece holder mounted on top of said thermal insulator; and

heating each zone of the workpiece independently with a heater disposed within said workpiece holder.

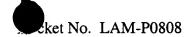
34. The method according to claim 33 further comprising monitoring the temperature of the multiple zones with a sensor in each zone.

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- 35. The method according to claim 34 further comprising adjusting the temperature of each zone based on said monitoring.
- 36. An apparatus for controlling the temperature across a workpiece profile having multiple zones, said apparatus comprising:

means for maintaining a base at a constant temperature, said constant temperature being below the temperature of the workpiece, said base having a thermal insulator mounted on top of said base;

means for holding the workpiece against a top face of a workpiece holder, said workpiece holder mounted on topol said thermal insulator; and

means for independently heating each zone of the workpiece with a heater disposed within said workpiece holder.

- 37. The apparatus according to claim 36 further comprising means for monitoring the temperature of the multiple zones with a sensor in each zone.
- 38. The apparatus according to claim 37 further comprising means for adjusting the temperature of each zone based on said monitoring.

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